

CLAIMS

Accordingly what is claimed is:

1. A container having a wall defining an interior and an exterior, at least a part of said wall comprising a plurality of layers including:

- (A) a first layer including a polyethylene polymer; and
- (B) a second layer having a substantially continuous film of a polypropylene, said film occurring at the portion of said part of said wall wherever said first layer occurs and being located, at said portion, toward the interior of said container from said first layer.

2. The container of Claim 1 wherein said polyethylene polymer in said first layer includes a post-consumer recycled plastic.

3. The container in Claim 2 wherein said film is continuous.

4. The container of Claim 3 wherein said film is located toward the interior from all layers containing at least about 48 ppb./0.020 in. of a contaminant.

5. The container of Claim 3 wherein said second layer includes at least about 50 percent by weight of polypropylene.

6. The container of Claim 4 wherein said post-consumer recycled plastic comprises at least about 15 percent by weight of said container.

7. The container of Claim 6 wherein said post-consumer recycled plastic comprises at least about 25 percent by weight of said container.

8. The container of Claim 6 wherein said second layer includes a blend of polypropylene and another polyolefin.

9. The container of Claim 8 wherein said other polyolefin forms domains within said blend.

10. The container of Claim 6 wherein said container is blow molded.

11. The container of Claim 6 wherein said container is thermoformed.

12. The container of claim 6 wherein said container is injection molded.

13. The container of Claim 6 wherein said post-consumer recycled plastic includes a majority of polyethylene.

14. The container of Claim 6 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about 20 parts per billion by weight of the container's contents of a contami-

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nant from said first layer in 10 days.

15. The container of Claim 6 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about one percent of the contaminants in said first layer in 10 days.

16. The container of Claim 6 including a third layer located toward the exterior of said second layer, said third layer comprising reground trim scrap.

17. The container of Claim 16 wherein said trim scrap includes post-consumer recycled plastic.

18. The container of Claim 6 wherein said second layer constitutes at least about one percent by weight of said container.

19. The container of Claim 18 wherein said second layer constitutes at least about 10 percent by weight of said container.

20. The container of Claim 6 wherein said post-consumer recycled plastic has greater than about 48 ppb./0.020 in. of contaminant.

21. The container of Claim 2 further including a third layer containing EVOH located between said first and second layers.

22. The container of Claim 21 wherein said film of polypropylene constitutes at least about one percent by weight of said container.

23. A container having a wall defining an interior and an exterior, at least a part of said wall comprising a plurality of layers including:

- (A) a first layer having post-consumer recycled polyethylene resin;
- (B) a second layer having a substantially continuous film of EVOH, said film occurring at a portion of said part of said wall wherever said first layer occurs and being located, at said portion, toward the interior of said container from said first layer.

<sup>2</sup> 24. The container in Claim <sup>1</sup> 23 wherein said film is continuous.

<sup>3</sup> 25. The container of Claim <sup>2</sup> 24 wherein said film is located toward the interior from all layers containing at least about 48 ppb./0.020 in. of contaminant.

<sup>4</sup> 26. The container of Claim <sup>2</sup> 24 wherein said portion is a first portion and said film is a first film and further comprising a third layer having a second continuous film of a polyethylene or polypropylene, said second film occurring at a second portion of said part of said wall wherever said first film occurs and being located, at said second portion,

toward the interior of said container from said second layer.

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27. The container of Claim ~~26~~<sup>4</sup> wherein said post-consumer recycled <sup>resin</sup>~~plastic~~ comprises at least about 15 percent by weight of said container.

A  
6  
28. The container of Claim ~~27~~<sup>5</sup> wherein said post-consumer recycled <sup>resin</sup>~~plastic~~ comprises at least about 25 percent by weight of said container.

7  
29. The container of Claim ~~27~~<sup>5</sup> wherein said second continuous film is of polypropylene.

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30. The container of Claim ~~29~~<sup>7</sup> wherein said film of polypropylene constitutes at least about one percent by weight of said container.

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31. The container of Claim ~~30~~<sup>8</sup> wherein said film of polypropylene constitutes at least about 10 percent by weight of said container.

10  
32. The container of Claim ~~27~~<sup>5</sup> further including an adhesive in contact with said EVOH.

11  
33. The container of Claim ~~27~~<sup>5</sup> further including a fourth layer between said first and second layers and a fifth layer between said second and third layers, both of said fourth and fifth layers being in contact with said EVOH and providing adhesiveness between said EVOH and the layers

of said container lying adjacent to said fourth and fifth layers away from said EVOH.

<sup>12</sup>  
~~34.~~ The container of Claim <sup>11</sup>~~33~~ further including a sixth layer located on the exterior from said fourth layer, said sixth layer comprising reground trim scrap of materials contained in said first to fifth layers.

<sup>13</sup>  
~~35.~~ The container of Claim <sup>5</sup>~~27~~ wherein said post-consumer recycled <sup>resin</sup>~~plastic~~ has greater than about 48 ppb./.020 in. of contaminant.

<sup>14</sup>  
~~36.~~ The container of Claim <sup>5</sup>~~27~~ wherein said EVOH comprises about 1.5 to 13 percent by weight of said container.

<sup>15</sup>  
~~37.~~ The container of Claim <sup>14</sup>~~36~~ wherein said EVOH comprises about two to four percent by weight of said container.

<sup>16</sup>  
~~38.~~ The container of Claim <sup>5</sup>~~27~~ wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled <sup>resin</sup>~~plastic~~ into said interior of said container of more than about 20 parts per billion by weight of a contaminant from said first layer in 10 days.

<sup>17</sup>  
~~39.~~ The container of Claim <sup>5</sup>~~27~~ wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled <sup>resin</sup>~~plastic~~ into said interior of said container of more than about one percent of the

contaminants in said first layer in 10 days.

<sup>18</sup>  
~~40~~. The container of Claim <sup>5</sup>~~27~~ wherein said container is blow molded.

<sup>19</sup>  
~~41~~. The container of Claim <sup>5</sup>~~27~~ wherein said container is thermoformed.

<sup>20</sup>  
~~42~~. The container of Claim <sup>6</sup>~~27~~ wherein said container is injection molded.

<sup>21</sup>  
~~43~~. The container of Claim <sup>5</sup>~~27~~ wherein said post-consumer recycled <sup>resin</sup>~~plastic~~ includes a majority of polyethylene.

44. A container having a wall defining an interior and an exterior, at least part of said wall comprising (1) a layer having post-consumer recycled polyethylene resin and (2) a substantially continuous film of fluorinated polyethylene, said film occurring at a portion of said part of said wall wherever said layer occurs and being located, at said portion, toward the interior of said container from said post-consumer recycled resin.

45. The container in Claim 44 wherein said film is continuous.

46. The container of Claim 45 wherein said film is located toward the interior from all layers containing at least about 48 ppb./0.020 in. of contaminant.

47. The container of Claim 45 wherein said continuous

film is on the interior surface of said wall.

48. The container of Claim 47 wherein said film forms the interior surface of said layer.

49. The container of Claim 47 wherein said post-consumer recycled plastic comprises at least about 15 percent by weight of said container.

50. The container of Claim 49 wherein said post-consumer recycled plastic comprises at least about 25 percent by weight of said container.

51. The container of Claim 49 wherein said container is blow molded.

52. The container of Claim 49 wherein said container is thermoformed.

53. The container of Claim 49 wherein said container is injection molded.

54. The container of Claim 49 wherein said post-consumer recycled plastic includes a majority of polyethylene.

55. The container of Claim 49 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about 20 parts per billion by weight of the container's contents of a contaminant from said first layer in 10 days.



56. The container of Claim 49 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about one percent of the contaminants in said first layer in 10 days.

57. The container of Claim 49 including a second layer located toward the exterior of said film, said second layer comprising reground trim scrap.

58. The container of Claim 49 wherein said post-consumer recycled plastic has greater than about 48 ppb./0.020 in. of contaminant.

59. The container of Claim 49 wherein said layer is a first layer and further including a second layer between said first layer and said continuous film, said second layer being devoid of said resin *post-consumer recycled polyethylene* and including polyethylene.

60. A method for making a container comprising:

(A) composing a resin incorporating post-consumer recycled thermoplastic containing polyethylene; and

(B) molding a container having a wall defining an interior and an exterior, said molding including:

(1) forming from said resin a first layer of at least part of said wall; and

(2) forming at said part of said wall a second layer having a substantially continuous film

of polypropylene, said film occurring at the portion of said wall wherever said first layer occurs and being located toward the interior of said container from said first layer.

61. The container in Claim 60 wherein said film is continuous.

62. The container of Claim 61 wherein said film is located toward the interior from all layers containing at least about 48 ppb.//.020 in. of contaminant.

63. The method of Claim 61 wherein said second layer includes at least about one percent by weight of polypropylene.

64. The container of Claim 63 wherein said second layer includes at least about 10 percent by weight of polypropylene.

65. The method of Claim 61 wherein said post-consumer recycled resin comprises at least about 15 percent by weight of said container.

66. The method of Claim 65 wherein said post-consumer recycled plastic comprises at least about 25 percent by weight of said container.

67. The method of Claim 65 wherein the composing of

said resin includes heating said resin to a molten state.

68. The method of Claim 67 wherein said recycled thermoplastic, prior to heating said resin to a molten state, is in a reduced size condition.

69. The method of Claim 68 further including, prior to heating said resin to a molten state, reducing the size of the pieces of said post-consumer thermoplastic.

70. The method of Claim 65 wherein said second layer includes a blend of polypropylene and another polyolefin.

71. The method of Claim 70 wherein said other polyolefin forms domains within said blend.

72. The method of Claim 65 wherein the step of molding said container includes coinjecting said first and second layers.

73. The method of Claim 72 wherein the step of molding said container includes, after the coinjecting of said first and second layers, blow molding the coinjected layers.

74. The method of Claim 65 wherein the step of molding said container includes coextruding said first and second layers.

75. The method of Claim 65 wherein the step of molding said container includes, after coextruding said first and second layers, blow molding the coextruded layers.

76. The method of Claim 75 wherein the step of molding said container includes, after coextruding said first and second layers, thermoforming the coextruded layers.

77. The method of Claim 65 wherein said post-consumer recycled plastic includes a majority of polyethylene.

78. The method of Claim 65 wherein said film is formed with a sufficient thickness and the capability to prevent the passage from post-consumer recycled plastic into said interior of said container of more than about 20 parts per billion by weight of the container's contents of a contaminant from said first layer in 10 days.

79. The method of Claim 65 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about one percent of the contaminants in said first layer in 10 days.

80. The method of Claim 65 further including forming a third layer said third layer being located between said first and second layers, said third layer comprising re-ground trim scrap.

81. The method of Claim 80 wherein said trim scrap includes post-consumer recycled plastic.

82. The method of Claim 65 wherein said second layer constitutes at least about one percent by weight of said

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container.

83. The method of Claim 82 wherein said second layer constitutes at least about 10 percent by weight of said container.

84. The method of Claim 65 wherein said post-consumer recycled plastic has greater than about 48 ppb./0.020 in. of contaminant.

85. The method of Claim 61 further including forming a third layer containing EVOH, said third layer being located between said first and second layers.

86. The method of Claim 85 wherein said film of polypropylene constitutes at least about one percent by weight of said container.

87. The method of Claim 86 wherein said film of polypropylene constitutes at least about 10 percent by weight of said container.

88. A method for making a container comprising:

(A) composing a resin incorporating post-consumer recycled thermoplastic containing polyethylene; and

(B) molding a container having a wall defining an interior and an exterior, said molding including:

(1) forming from said resin a first layer of at least part of said wall;

(2) forming at said part of said wall a second layer having a substantially continuous film of EVOH, said film occurring at a portion of said wall wherever said first layer occurs and being located toward the interior of said container from said first layer.

89. The container in Claim 88 wherein said film is continuous.

90. The container of Claim 89 wherein said film is located toward the interior from all layers containing at least about 48 ppb./0.020 in. of contaminant.

91. The method of Claim 89 wherein said film is a first film, said portion is a first portion, and further including the step of forming at said part of said wall a third layer having a second continuous film of polyethylene or polypropylene, said second film occurring at a second portion of said wall wherever said second layer occurs and being located toward the interior of said container from said second layer.

92. The method of Claim 91 wherein said post-consumer recycled plastic in said first layer comprises at least about 15 percent by weight of said container.

93. The method of Claim 92 wherein said post-consumer recycled plastic comprises at least about 25 percent by

weight of said container.

94. The method of Claim 92 wherein the composing of said resin includes heating said resin to a molten state.

95. The method of Claim 94 wherein said recycled thermoplastic, prior to heating said resin to a molten state, is in a reduced size condition.

96. The method of Claim 95 further including, prior to heating said resin to a molten state, reducing the size of the pieces of said post-consumer recycled thermoplastic.

97. The method of Claim 92 wherein said continuous film is formed from polypropylene.

98. The method of Claim 97 wherein said film of polypropylene constitutes at least about one percent by weight of said container.

99. The method of Claim 98 wherein said film of polypropylene constitutes at least about 10 percent by weight of said container.

100. The method of Claim 92 further including an placing adhesive in contact with said EVOH.

101. The method of Claim 100 further including forming a fourth layer, said fourth layer being located between said first and second layers, and forming a fifth layer, said fifth layer being located between said second and third

layers, both of said fourth and fifth layers being in contact with said EVOH and providing adhesiveness between said EVOH and the layers of said container lying adjacent to said fourth and fifth layers away from said EVOH.

102. The method of Claim 101 further including forming a sixth layer, said sixth layer being located between said first layer and said fourth layer, said sixth layer comprising reground trim scrap of materials contained in said first to fifth layers.

103. The method of Claim 92 wherein said post-consumer recycled plastic has greater than about 48 ppb./0.020 in. of contaminant.

104. The method of Claim 92 wherein said EVOH comprises about 1.5 to 13 percent by weight of said container.

105. The method of Claim 104 wherein said EVOH comprises about two to four percent by weight of said container.

106. The method of Claim 92 wherein the step of molding said container includes coinjecting said first, second, and third layers.

107. The method of Claim 106 wherein the step of molding said container includes, after the coinjecting of said first, second, and third layers, blow molding the coinjected layers.



108. The method of Claim 92 wherein the step of molding said container includes coextruding said first, second, and third layers.

109. The method of Claim 108 wherein the step of molding said container includes, after coextruding said first, second, and third layers, blow molding the coextruded layers.

110. The method of Claim 108 wherein the step of molding said container includes, after coextruding said first and second layers, thermoforming the coextruded layers.

111. The container of Claim 92 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about 20 parts per billion by weight of a contaminant from said first layer in 10 days.

112. The container of Claim 92 wherein said film has a sufficient thickness and the capability of preventing the passage from post-consumer recycled plastic into said interior of said container of more than about one percent of the contaminants in said first layer in 10 days.

113. A method of making a container comprising:

(A) composing a resin incorporating post-consumer

- recycled thermoplastic containing polyethylene;
- (B) molding a container having a wall defining an interior and an exterior, at least part of said wall comprising a layer having said resin; and
- (C) forming, at a portion of said part of said wall wherever said layer occurs and toward the interior of said container from said resin, a substantially continuous film of fluorinated polyethylene.

114. The container in Claim 113 wherein said film is continuous.

115. The container of Claim 114 wherein said film is located toward the interior from all layers containing at least about 48 ppb./0.020 in. of contaminant.

116. The method of Claim 114 wherein said continuous film is located on the interior surface of said wall.

117. The method of Claim 116 wherein said layer is a first layer, said container is molded with a second layer including polyethylene, and said second layer being located on said interior of said wall, and said film is formed by contacting said second layer with fluorine gas under reactive conditions.

118. The method of Claim 117 wherein the contacting of said polyethylene of said second layer with said fluorine gas occurs during the molding of said container.

119. The method of Claim 117 wherein the contacting of said polyethylene of said second layer with said fluorine gas occurs after the molding of said container.

120. The method of Claim 117 wherein said polyethylene on said interior of said container is part of said second layer.

121. The method of Claim 120 wherein said film forms the interior surface of said second layer.

122. The method of Claim 117 wherein said post-consumer recycled plastic comprises at least about 15 percent by weight of said container.

123. The method of Claim 122 wherein said post-consumer recycled plastic comprises at least about 25 percent by weight of said container.

124. The method of Claim 122 wherein the composing of said resin includes heating said resin to a molten state.

125. The method of Claim 124 wherein said recycled thermoplastic, prior to heating said resin to a molten state, is in a reduced size condition.

126. The method of Claim 125 further including, prior to heating said resin to a molten state, reducing the size of the pieces of said post-consumer recycled thermoplastic.

127. The method of Claim 122 wherein the step of

molding said container includes coinjecting said first and second layers.

128. The method of Claim 127 wherein the step of molding said container includes, after the coinjecting of said first and second layers, blow molding the coinjected layers.

129. The method of Claim 122 wherein the step of molding said container includes coextruding said first and second layers.

130. The method of Claim 129 wherein the step of molding said container includes, after coextruding said first and second layers, blow molding the coextruded layers.

131. The method of Claim 129 wherein the step of molding said container includes, after coextruding said first and second layers, thermoforming the coextruded layers.

132. The method of Claim 122 wherein said post-consumer recycled plastic includes a majority of polyethylene.

133. The method of Claim 122 wherein said film is formed with a sufficient thickness and the capacity to prevent the passage from said post-consumer recycled plastic into said interior of said container of more than about 20 parts per billion by weight of the container's contents of a contaminant from said first layer in 10 days.

138. The method of Claim 137 wherein said second layer comprises about 20 percent of the weight of said container.